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ABSTRACT

Results of nationwide studies show that standardized achievement test scores of public school children have declined since the mid-1960's, after decades of steady improvement. This seems to be true regardless of grade level, subject tested, or geographic area. Comparing Tacoma's performance with that of the nation and school systems like it as a whole gives a general perspective. Sixty-one school systems nationwide were identified as similar to Tacoma in pupil membership (25,000-50,000). From census data, selected demographic characteristics thought to be related to academic performance (such as median family income, education level, etc.) were listed. In response to a request for test information, 22 of the 52 districts provided useable data. These 22 districts were found to be statistically similar to the other 30 and to Tacoma demographically, and thus constituted the comparison districts in this study. Data provided were not consistent from one district to another, but they did allow comparison of Tacoma with varying numbers of the 22 districts for one to four years, 1970-71 through 1973-74, in reading comprehension and arithmetic computation at Grades 3, 6, and 8. Comparisons of interest were (1) relative score levels, and (2) score trends over time. Specific findings are discussed although they should be interpreted with caution. (Author/DEP)

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BASIC SKILL PERFORMANCE TRENDS
IN TACOMA
COMPARED WITH SIMILAR DISTRICTS

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Abstract

BASIC SKILL PERFORMANCE TRENDS IN TACOMA COMPARED WITH SIMILAR DISTRICTS

Across the country pupil performance in basic skills is down. Results of nationwide studies show that standardized achievement test scores of public school children have declined since the mid-1960's, after decades of steady improvement. This seems to be true regardless of grade level, subject tested, or geographic area. Of the many hypotheses advanced to account for this phenomenon, few have been tested.

Tacoma's scores, too, have gone down in recent years. Comparing Tacoma's performance with that of the nation as a whole gives a general perspective. In the current study a more specific frame of reference is considered by asking, "How are Tacoma children performing in the basic skills as compared with children in school systems like Tacoma?"

Sixty-one school systems nationwide were identified as similar to Tacoma in pupil membership (25,000-50,000). Seattle and Portland were added to increase Northwest representation, though their pupil memberships were larger. Of the 63 districts, U. S. census data were available for 52. From the census data, selected demographic characteristics thought to be related to academic performance (such as median family income, education level, etc.) were listed. In response to a request for test information, 22 of the 52 districts provided useable data. These 22 districts were found to be statistically similar to the other 30 and to Tacoma demographically, and thus constituted the comparison districts in this study.

Data provided were not consistent from one district to another, but they did allow comparison of Tacoma with varying numbers of the 22 districts for one to four years, 1970-71 through 1973-74, in reading comprehension and arithmetic computation at Grades 3, 6 and 8. Comparisons of interest were (1) relative score levels, and (2) score trends over time.

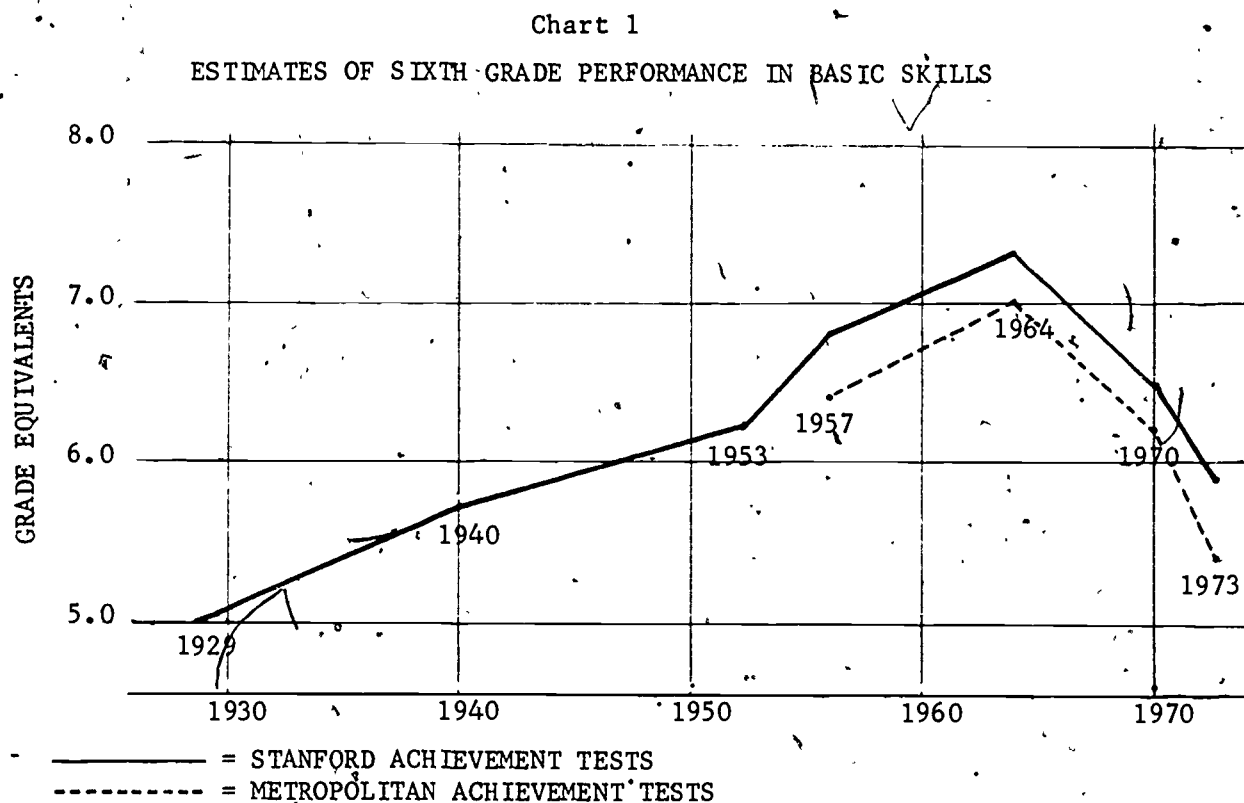
Results of the study must be interpreted with caution. While various pieces of Tacoma data can confidently be compared with each other, comparisons of Tacoma data with composite data from other districts is hazardous because (1) different districts provided information for different grade levels and subject areas for different years, (2) different tests were used by different districts at different times of year, but all were assumed to be equally valid, reliable, representatively normed, and with scores undistorted by "adjustment" to a common time of year, (3) the method of deriving mean scores was unknown, and methodology affects outcome, (4) mean and median scores were intermixed for treatment, though they are seldom identical, (5) grade equivalent scores were used, though they are inherently unstable, don't lend themselves well to statistical treatment, and are easily misinterpreted, and (6) finally, at each comparison point, different combinations of these variables were put together into a single score. With these caveats in mind, these highly tentative observations are offered:

1. Tacoma and the comparison districts were below the national norm in both subject areas, for all years, and at all grade levels. The discrepancies were least at Grade 3 and generally greatest at Grade 8.
2. At Grade 3, Tacoma and the comparison districts performed about the same in 1972, the only year for which data were available for both. Tacoma's levels and trends in 1972-74 were similar to those of the comparison districts for 1969-72, showing slight improvement in reading and stable performance in arithmetic.
3. At Grade 6 for the four years compared in reading comprehension, Tacoma was lower than the comparison districts and the trend was slightly downward for both. In arithmetic computation, Tacoma was below the comparison districts until 1973, when their scores were similar. Tacoma's trend in arithmetic was flat, while that of the comparison districts was slightly downward.
4. At Grade 8 for the four years compared, Tacoma was progressively lower than the comparison districts in reading comprehension, after both began at about the same level. Tacoma's trend was rather steeply downward while comparison districts dipped slightly and recovered. In arithmetic computation, Tacoma was consistently below the comparison districts. Tacoma's trend line was erratic, but overall level, while comparison districts showed a substantial increase.

BASIC SKILL PERFORMANCE TRENDS IN TACOMA COMPARED WITH SIMILAR DISTRICTS

Introduction

In the College Board News of March 1974 published by the College Entrance Examination Board, the headline trumpets, "SAT (Scholastic Aptitude Test) Scores Down; Study of Causes Continues." At a May 15, 1974, meeting sponsored by Washington State Intermediate School District No. 110 and Harcourt, Brace, Jovanovich in Seattle, Dr. Bjorn Karlsen, author of the Stanford Diagnostic Reading Test, presented results of a study of pupil performance on the several revisions of the Stanford Achievement Tests over a forty-four year period. These data describe the performance of sixth grade pupils in the revisions of 1929, 1940, 1953, 1957, 1964, 1970, and 1973. Stanford Achievement Test score trends are similar to those obtained from successive renormings of Metropolitan Achievement Test revisions beginning in 1957. Chart 1 shows these trends:



In summary, the level of performance of pupils increased approximately .6 of a year per decade up to 1964 and has declined at about twice that rate since 1964.

Dr. Karlsen also described trends in British basic skill achievement over this same period, which generally matched the Stanford Achievement Test data.

For detailed indices of Tacoma's performance in basic skills, the reader is referred to the Appendix. Seven charts display cross-sectional and longitudinal data. Some trends can be traced from as early as 1962 and extend to the 1974-75 school year.

The Question and Some Hypotheses

This study is an effort to respond to the question, "Are Tacoma's children performing less well than formerly in basic skills, and is the pattern, if discernible, common to many geographic areas, or is it limited to Tacoma?" Phrased another way, the question becomes, "How are Tacoma's children performing in basic skills as compared with children in districts 'like' Tacoma?"

The possible hypotheses are that: (1) Tacoma children are doing as well as children in other districts like Tacoma; (2) Tacoma children are performing less well than children in other districts like Tacoma; (3) Tacoma children are performing better than children in districts like Tacoma. Limitations of the data gathered restrict answers to two basic skill areas (reading comprehension, arithmetic computation) and three levels (Grades 3, 6 and 8).

Sampling Procedure

To discover the "like-ness" of other districts to Tacoma, a list of districts with enrollments of from twenty-five to fifty thousand was prepared. Tacoma's K-12 membership was about 34,000. Sixty-one districts were identified*. These districts were invited to share data in four areas: reading comprehension, arithmetic computation, mechanics of language, and academic aptitude, over the years 1969 to the present. In addition, two Northwest districts larger than the 50,000 student limit were included. Data were requested for grades 3-6 (elementary), grades 7-9 (junior high) and grades 10-12 (senior high).

Replies were received from thirty-six districts. Fourteen of these found it impossible to participate for various reasons, including "decline to participate" and "no data" which fit the specifications. Follow-up included telephone calls to several districts. Useable data were received from twenty-two districts in two areas only (reading comprehension and arithmetic computation) and at grade levels 3, 6, and 8. However, when attempting to trace patterns over five years, the numbers of useable district results were considerably lower. Most complete data were received at Grade 6 in the area of reading comprehension.

Representativeness of Sample

In addition to selection of districts of similar enrollment, demographic data were gathered on fifty-two of the sixty-three districts contacted. The choice of demographic variables was limited to those (a) available in 1970 U. S. Census reports** and (b) suggested by research as related to academic performance. They are: percentage of Negroes in the population; percentage of 16-21 year-olds not in school, not high school graduates; median school years completed in the population; percentage of high school graduates in the population; median family income; percentage of family incomes below the poverty level; percentage of families receiving public assistance; and median Negro family income.

Of these fifty-two districts, twenty-two provided useable achievement data and thirty did not. Table I compares demographic data of these two groups. Note that the differences failed to reach significance in seven of the eight comparisons. The one variable significantly different was VII, the percent of families receiving public assistance. Except for this one variable, then, it can be reasonably assumed that the thirty districts as a group were like the twenty-two districts as a group on the variables considered.

*Administrative Information Report No. 3, NASSD, NAESP, "Urban Principals Salary Report"

**"Census Tracts Standard Metropolitan Statistical Area," U. S. Department of Commerce, Bureau of the Census, 1972; U. S. Government Printing Office, Washington, D. C.

Table I

DEMOGRAPHIC DATA: COMPARISON OF DISTRICTS WITH AND WITHOUT USEABLE ACHIEVEMENT DATA

VARIABLE	30 WITHOUT ACHIEVEMENT DATA			22 WITH ACHIEVEMENT DATA			t-Scores of Group Differences
	\bar{x}	s	range	\bar{x}	s	range	
I % Negro	17.70	12.22	39.9- 0.1	17.16	13.90	52.8- 1.3	.140
II % not high school grads, not in school (16-21)	15.03	5.47	26.4- 3.8	14.08	3.44	21.8- 7.9	.748
III Median school year completed	11.89	.77	12.9- 9.5	11.95	.53	12.8-10.6	.353
IV % high school graduates	53.85	10.81	75.2-31.3	53.50	7.89	68.8-39.8	.132
V Median family income	9527	1415	13743-7612	9588	1067	11745-7143	.173
VI % family incomes below poverty level	10.99	4.10	18.1- 3.7	10.44	3.49	21.6- 6.0	.514
VII % families receiving public assistance	23.04	8.75	38.8- 4.2	31.37	7.45	42.9-11.9	3.627**
VIII Median Negro family income	6539	1485	10225-4108	6882	1247	8625-4448	.884

**Significant at $p < .01$ Similarity of Sample to Tacoma

The data in Table II suggest that Tacoma was also similar to the responding districts, as a group, on six of the eight demographic variables. Although no appropriate technique is available to test for statistical significance of differences, inspection shows that Tacoma had a smaller percentage of Negroes in the total population and a higher median Negro

Table II

DEMOGRAPHIC DATA: COMPARISON OF TACOMA WITH 22 DISTRICTS
PROVIDING USEABLE ACHIEVEMENT DATA

VARIABLE	TACOMA	22 DISTRICTS WITH USEABLE ACHIEVEMENT DATA	
	\bar{x}	\bar{x}	s
I % Negro	6.8	17.16	13.90
II % not high school grads, not in school (16-21)	12.3	14.08	3.44
III Median school years completed	12.2	11.95	.53
IV % high school graduates	55.5	53.50	7.89
V Median family income	9537	9588	1067
VI % family incomes below poverty level	9.2	10.44	3.49
VII % families receiving public assistance	30.0	31.37	7.45
VIII Median Negro family income	8026	6882	1247

family income than the respective means of the comparison districts. However, the Tacoma central tendency scores, without exception, fell within one standard deviation of the means of medians of responding districts.

This study suggests the need for continuing demographic measures on a yearly basis. This would allow changes in demographic variable values to be related to changes in achievement and provide more definitive answers to questions about relationships. The present study allows only a snapshot of these comparisons at one point in time--the 1970 census.

Pupil Performance/Demographic Variable Relationships

Tangential to the main focus of the study, the data were also subjected to a correlational analysis of the relationship between each of the demographic variables and student achievement.

Table III displays the correlation coefficient of each of the demographic variables with the district scores (not pupil scores) reported in one or more of the achievement areas and levels for the year 1970-71.

This was the year which followed the year of census data collection. Numbers of districts in each area are as follows: Grade 3, reading comprehension, 13; Grade 6, reading comprehension, 17; Grade 8, reading comprehension, 15; Grade 3, arithmetic computation, 11; Grade 6, arithmetic computation, 17; Grade 8, arithmetic computation, 14.

Table III

CORRELATIONS BETWEEN ACADEMIC ACHIEVEMENT AND DEMOGRAPHIC VARIABLES AT GRADES 3, 6, AND 8 (1970-71)

DEMOGRAPHIC VARIABLE	GRADE:	ACADEMIC ACHIEVEMENT					
		Reading Comprehension			Arithmetic Computation		
		3	6	8	3	6	8
I % Negro		-.511	-.396	-.291	-.266	-.141	-.273
II % not high school grads, not in school (16-21)		-.438	-.578*	-.520*	-.207	-.141	-.525
III Median school years completed		.555*	.435	.560*	.347	.266	.638*
IV % high school graduates		.309	.482*	.507	.181	.242	.550*
V Median family income		.275	.139	.181	.509	.000	.331
VI % family incomes below poverty level		-.104	-.358	-.354	-.303	-.114	-.317
VII % families receiving public assistance		0.078	-.229	-.580*	.181	-.244	-.360
VIII Median Negro family income		.000	-.033	.100	.413	.089	.126

*p<.05

Variables III and IV, which reflect community educational level, are all positively correlated with both reading comprehension and arithmetic computation at all levels. Similarly, Variable II (dropouts?) is negatively correlated with both areas at all levels. Variables V and VIII, which reflect community economic level, are all positively correlated with achievement in both areas at all levels with three exceptions. The exceptions are, Variable V vs. sixth grade arithmetic computation--zero correlation; Variable VIII vs. third grade reading comprehension--zero correlation--and sixth grade reading comprehension--slight negative correlation.

Limitations of Data and Assumptions

An obvious limitation of the data results from the fact that districts use different tests. These data include scores from the Iowa Tests of Basic Skills, Stanford Achievement Tests, Comprehensive Tests of Basic Skills, California Achievement Tests, Metropolitan Achievement Tests, Science Research Achievement Tests, and the SRA Assessment Survey. Tacoma used the Comprehensive Tests of Basic Skills, with the two exceptions noted in Charts 4 and 5.

Another limitation which introduces error is the fact that districts test at different months of the school year, and any "adjustment" to a common time introduces error.

As seen in Charts 2-7, the numbers of districts at each year of the trend lines differ.

A final limitation results from different techniques of data reduction used by different scoring centers. Rather substantial differences result from, for example, averaging grade equivalents as compared with conversion to standard scores, averaging these and then converting to grade equivalents. And these procedures produce different means from averaging raw scores and then converting to grade equivalents.

The following assumptions must be made to justify the answers to the questions:

1. Student performance in reading comprehension and arithmetic computation is adequately and equally measured by each of the above tests.
2. Each of the above tests adequately sampled the subject matter and was normed using representative samples for the grades tested to produce reliable and valid results.
3. Tests were administered according to standardization directions.
4. The populations were equally motivated to perform on the tests.
5. The tests were accurately scored and reported.
6. Means and medians of the reported scores did not differ significantly.
7. Distributions from which means and medians were reported approached normality and were similar with respect to variance.
8. Tacoma averages, computed without exception from raw scores, can be meaningfully compared with other district averages, however computed.

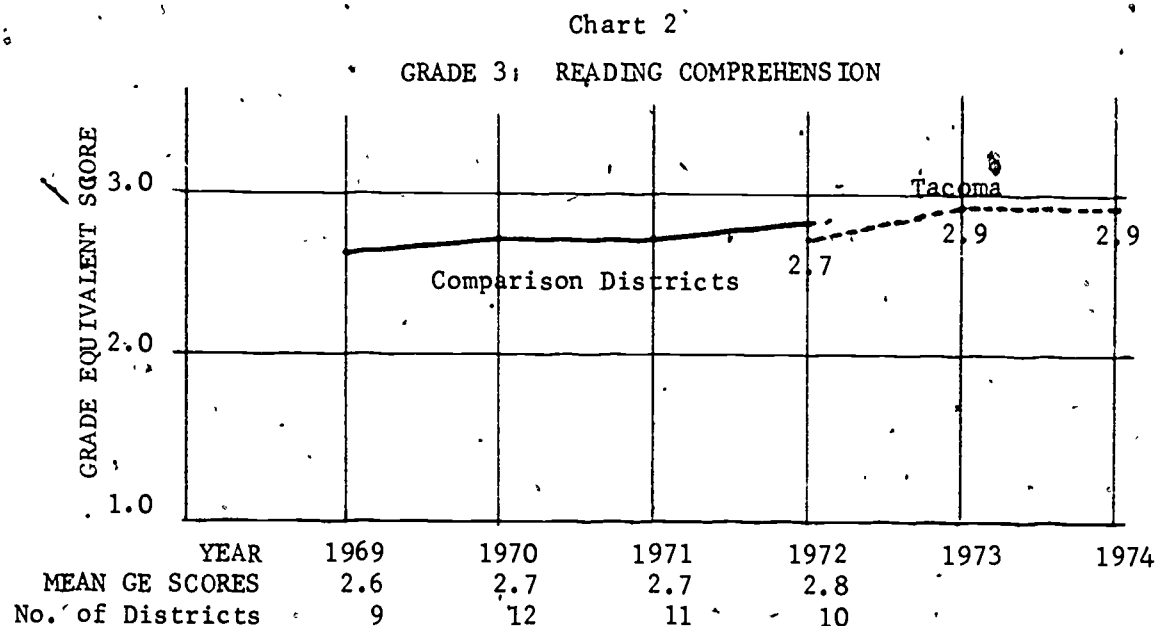
Each district reported scores for total grades. If district totals are related to grade size as in Tacoma, we would expect grade N's of from 2046 to 4093 in these districts. Given the size of these populations, it seems reasonable to assume a balancing out of errors attributable to administration and scoring. Also, it seems reasonable to assume that the distributions are normal, thus allowing the combining of district means and medians. At sixth grade, for example, as many as seventeen district means were combined. The resulting data reflect as many as 51,000 individual scores.

Analyzing the Data

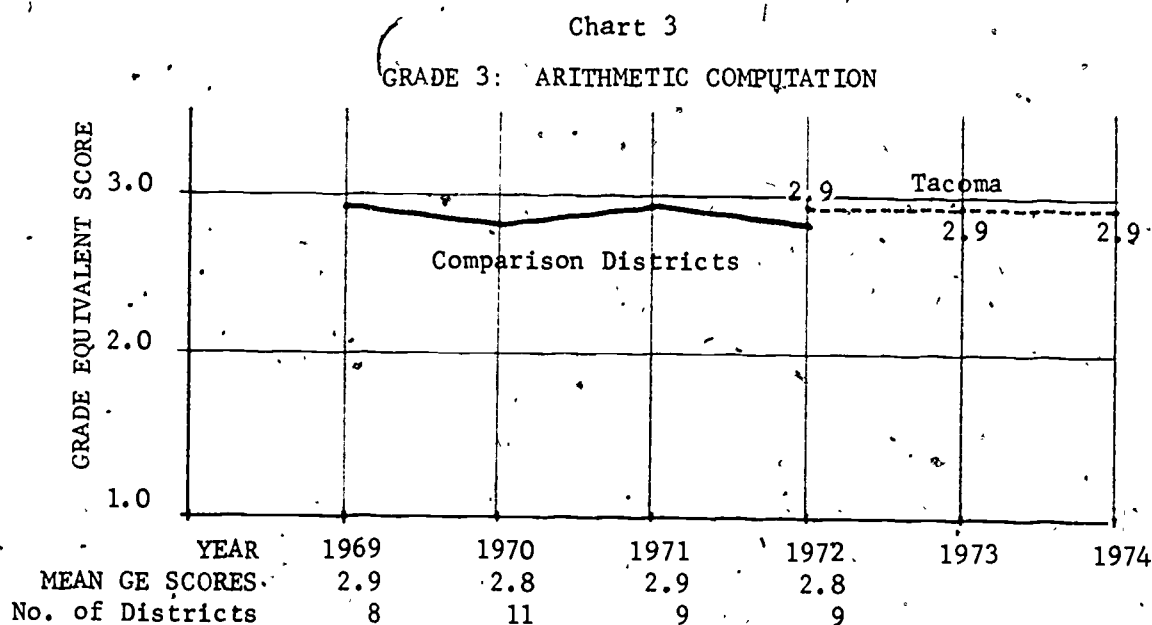
In the present study district averages were combined regardless of the test used. Adjustments were made in each case where testing was done in months other than September, so that comparisons could be readily made with the norms. For example, grade equivalent scores reported for November were reduced by two months.

Tacoma/Responding Districts Comparisons

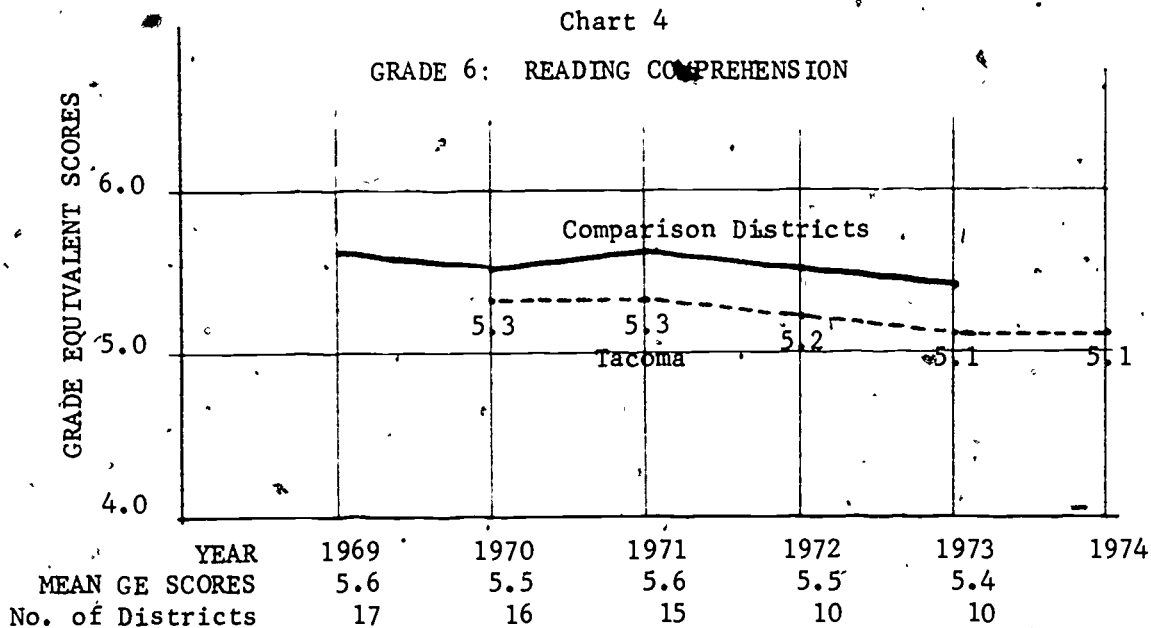
Charts 2 and 3 show that only in 1972 were third grade data available from both Tacoma and the comparison districts. Tacoma's performance in reading comprehension (Chart 2) from 1972 to 1974 appears to be at or slightly above the level established by the comparison districts from 1969 to 1972. Comparison districts and Tacoma both show slight improvement.



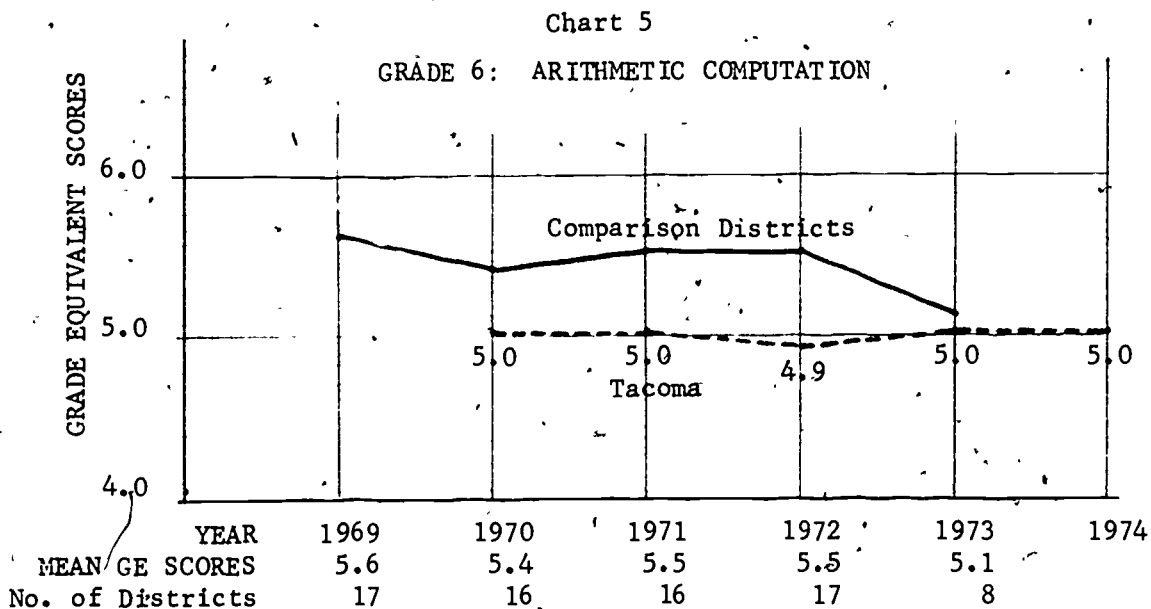
In arithmetic computation (Chart 3) Tacoma's third graders from 1972 to 1974 performed at a level very similar to that of the comparison districts from 1969 to 1972. Performance was very consistent during these years.



At Grade 6 comparable data were available for Tacoma and comparison districts from 1970 to 1973. In reading comprehension (Chart 4) both comparison districts and Tacoma show a slight overall decline in performance since 1970 (in 1969 a different test was used in Tacoma). Tacoma's level of performance is slightly below that of the comparison districts.



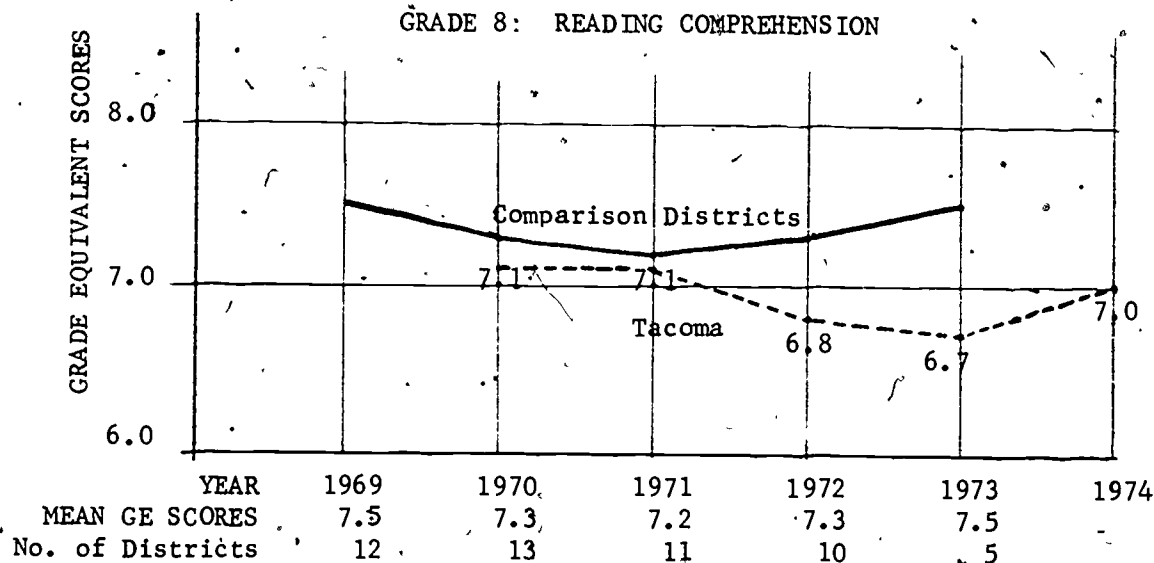
In arithmetic computation (Chart 5) performance of comparison districts has been declining, whereas Tacoma's sixth grade group has been extremely consistent since 1970 (in 1969 a different test was used in Tacoma). Tacoma's sixth graders have not been performing as well as comparison districts, until the two scores approached equality in the fall of 1973.



At Grade 8, comparison data are available from 1970 to 1973. In reading comprehension (Chart 6) comparison districts declined from 1969 to 1971, then improved from 1971 to 1973. Tacoma's eighth graders are performing below the comparison districts, and have shown quite a steep decline between 1971 and 1973, the same years comparison districts' performances were increasing. Tacoma recovered sharply in 1973, but there were no comparative data.

Chart 6

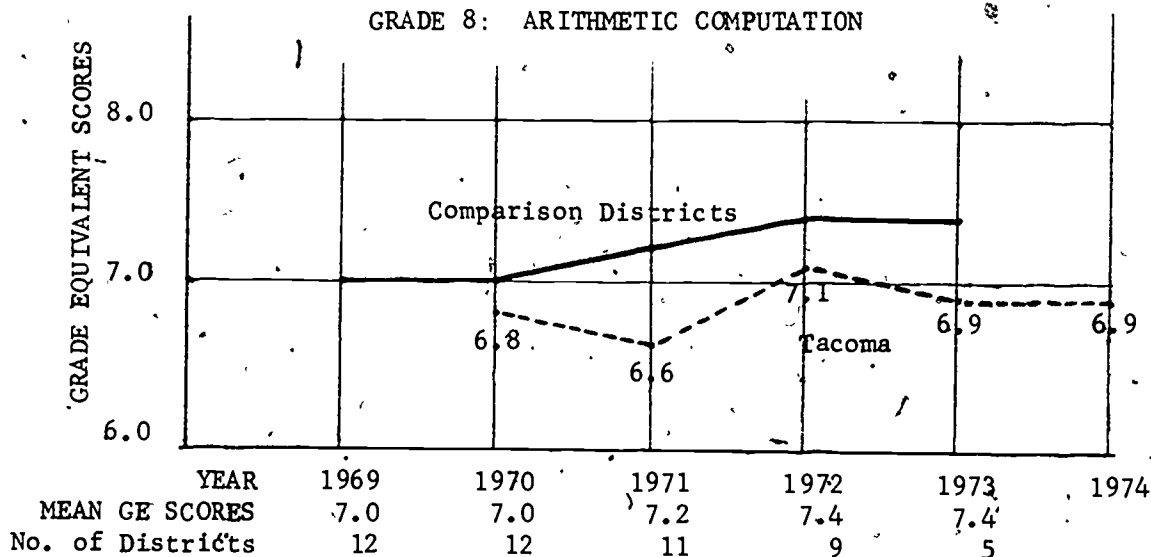
GRADE 8: READING COMPREHENSION



In arithmetic computation (Chart 7) Tacoma's eighth graders' performance has been erratic, with relatively large changes in both directions. Comparison districts demonstrated a fairly consistent upward trend, while Tacoma's overall trend is level. In all years, Tacoma's eighth graders were performing below comparison districts.

Chart 7

GRADE 8: ARITHMETIC COMPUTATION



Findings

The third grade mean scores of Tacoma and comparison districts overlap only in 1972. At that point, Tacoma was very slightly below the comparison districts in reading comprehension and slightly above the comparison districts in arithmetic computation. The trends suggest that Tacoma's third grade children have been performing over three years at about the same level as children in comparison districts during the preceding three and one overlap years. Arithmetic computation means show no up or down trend. Reading comprehension means both in Tacoma and comparison districts suggest slight improvement.

Tacoma sixth grade children are performing less well than comparison district children in reading comprehension. The very slight decline in the comparison districts is barely exceeded by Tacoma's decline. Arithmetic computation trends at Grade 6 are quite different. Comparison districts show a definite down trend while Tacoma is remarkably stable, showing no up or down trend. Tacoma sixth grade children in 1973 performed about as well as comparison districts in arithmetic computation, after being below in prior years.

In reading comprehension at Grade 8, comparison districts demonstrate two years of decline followed by two years of gain. No trend is discernible. Tacoma, after holding steady in 1970 and 1971, declined in 1972 and 1973, then regained most of the loss in 1974. In each year, performance is below that of the comparison districts. Despite a Tacoma performance increase at Grade 8 in arithmetic computation in 1972, no clear five year trend is discernible. In contrast, the comparison district trend line shows consistent improvement over the five year period. As in reading comprehension, Tacoma eighth grade children consistently performed below comparison districts in arithmetic computation.

Alternative Approaches to Studying the Question

Recognizing the limitations imposed by the data collected, it seems appropriate to ask whether more viable alternatives exist for answering such questions. There comes to mind the use of the Anchor Test Study* results in reading. Given raw scores, means, variance and an estimate of normality of distributions, greater confidence could be placed in the procedure of combining scores from various tests. However, other difficulties would obtain, for example the problems of differing testing times. Adjusting scores to some reference point would be difficult, if not impossible.

Another and perhaps more useful approach to answering such questions might involve the use of National Assessment (NAEP)** test items in the district testing program. This would theoretically allow a continuing comparison of Tacoma achievement with national and regional performance. This approach, if extended beyond K-12 parameters to include adults as in NAEP programs, would add an important dimension to the usual district assessment. It would provide information on the product of the schools out there in the "real" world, and would allow career data to influence curriculum decisions in the district.

Any serious attempt to implement NAEP procedures within a district, assuming State Assessment cooperation, should not be undertaken lightly. It would have to take into account the time, cost, and expertise needed to insure successful gathering, reduction, analysis, reporting, and meaningful interpretation and use of the data.

The most widely used method of answering the question is simply to compare district performance to the publisher's norms. This has the disadvantage of accepting the publisher's

*Anchor Test Study, Equivalence and Norm Tables for Selected Reading Achievement Tests, U. S. Department of Health, Education and Welfare, Office of Education, U. S. Government Printing Office, Washington, D. C. 1974.

**National Assessment of Educational Progress, Education Commission of the States, Denver, Colorado, Newsletter, published periodically; and other publications.

sampling procedures (both norm group and universe of curriculum areas) as being representative of the district's instructional program. Few districts are willing to equate their curricula, even in basic skills, with the curricular universes sampled by test publishers, and no district conforms except in a general way to the norming population sample of any given test.

To summarize, at this time and at the level of assessment procedure in districts generally, the present study design seems the most practical way of answering the question. Further efforts in this direction, however, should specify in more detail the data requested and the form in which the data are reported. In no way, however, is it likely to be "clean" enough to provide more than tentative comparisons.

APPENDIX

Table IV
DATA REQUESTS AND RESPONSES

State and School District	Requests for Data	Responses	Demographic Data Secured	Data Recd. and Used	State and School District	Requests for Data	Responses	Demographic Data Secured	Data Recd. and Used
<u>Alabama</u>					<u>Mississippi</u>				
Montgomery	x		x		Jackson	x		x	
<u>Arkansas</u>					<u>Nebraska</u>				
Little Rock	x		x		Lincoln	x		x	
<u>California</u>					<u>New Jersey</u>				
Anaheim	x	x	x		Jersey City	x		x	
Bakersfield	x	x	x	x	Paterson	x		x	
Fresno	x		x		<u>New York</u>				
Pomona	x				Buffalo	x			
Richmond	x	x			Rochester	x	x	x	
Riverside	x		x		Syracuse	x	x	x	
Sacramento	x	x	x	x	Yonkers	x			
San Bernardino	x	x	x	x	<u>North Carolina</u>				
San Jose	x		x		Greensboro	x	x	x	
Santa Ana	x	x			Winston-Salem	x		x	
Stockton	x	x	x	x	<u>Ohio</u>				
Torrance	x				Dayton	x	x	x	x
<u>Connecticut</u>					Parma	x	x		
Hartford	x	x	x	x	Youngstown	x	x	x	
<u>Georgia</u>					<u>Oregon</u>				
Columbus	x		x		Portland	x	x	x	x
Savanna-Ghatham County	x	x	x	x	<u>South Carolina</u>				
<u>Illinois</u>					Columbia	x	x	x	
Peoria	x	x	x	x	<u>Tennessee</u>				
Rockford	x		x		Knoxville	x	x	x	x
<u>Indiana</u>					<u>Texas</u>				
Evansville	x	x	x	x	Amarillo	x			
Fort Wayne	x	x	x	x	Corpus Christi	x		x	
Gary	x	x	x	x	Lubbock	x		x	
South Bend	x	x	x		Pasadena	x			
<u>Iowa</u>					<u>Utah</u>				
Des Moines	x	x	x	x	Farmington	x	x		
<u>Kansas</u>					Salt Lake City	x		x	
Kansas City	x		x		<u>Virginia</u>				
<u>Kentucky</u>					Arlington	x	x	x	
Louisville	x		x		Newport News	x	x	x	
<u>Massachusetts</u>					Norfolk	x	x	x	
Springfield	x	x	x	x	Portsmouth	x		x	
Worcester	x	x	x	x	Richmond	x	x	x	x
<u>Michigan</u>					<u>Washington</u>				
Flint	x	x	x	x	Seattle	x	x	x	x
Grand Rapids	x	x	x	x	Spokane	x	x	x	x
Lansing	x	x	x	x	<u>Wisconsin</u>				
Livonia	x				Madison	x		x	
					Racine	x		x	
TOTALS						63	36	52	22